CENTRAL INTELLIGENCE AGENCY

30 January 1951

INTELLIGENCE MEMORANDUM NO. 351

SUBJECT: Vulnerability of the Manganese Industry in the Gold Coast

1. Description of the Industry.

General.

The manganese complex of the Gold Coast is compact and highly mechanized. Ore is mined near Tarkwa in southwestern Gold Coast, transported 36 miles by rail to the modern port of Takoradi, and loaded aboard ocean vessels.

Mining.

a. Nsuta Area.

Practically the only producer of manganese ore in the Gold Coast is the African Manganese Co. Ltd., a British subsidiary of the American firm -- Union Carbon and Carbide Corporation. In 1946, head offices of the company were located at 19 St. Swithins Lane, London, E.C. 4.

The principal exploitation is in an area approximately 1 by 2½ miles in extent that runs in a north-northeast -- south-southwest direction about a mile east of the town of Nsuta and the main Tarkwa-Takoradi railroad which runs through Nsuta. Tarkwa is a larger town located at 5°18'N, 1°59'W, 2 miles north-northwest of Nsuta. The mine is known as the Nsuta-Dagwin Manganese Concession, which is reputed to be the largest single producer of manganese ore in the world.

Ore is removed from open cuts along the upper slopes of five hills by 1.5-cubic-yard Bucyrus steam and diesel shovels and is loaded into 5-ton steel dump cars. Cars are pulled to the treatment plant by diesel locomotives over a 2'6"-gauge track. Overburden on the cuts averages about 1 cubic yard per cubic yard of ore. Proved reserves of ore amount to 10 million tons, but there are indications that the reserves exceed this figure.

Note: This report, which has been prepared at the request of the Special Assistant for Intelligence, Department of State, on the basis of immediately available information, has not been coordinated with the intelligence organizations of the Departments of State, the Army, the Navy, and the Air Force. It contains information available to CIA as of 17 January 1951.

In treatment about 10 percent of the crude ore is rejected. The ore is first washed in a plant with a capacity of 300 long tons per hour, which uses 2.5 tons of water per ton of ore. The waste from this process is hauled to disposal dumps. The ore is then crushed and screened into three size groups:

(1) "Less than ¼ inch," which is run to waste.
(2) "Plus ¼ inch," which is sintered.
(3) "Over 1 inch," which is passed through a secondary crusher and screened to 2 inches. The remaining lumps are siliceous pieces hand-picked from a moving belt.

The "plus ¼ inch" is transported by narrow-gauge line (probably 2'6") to a plant alongside the main railroad a mile from the washing plant, where it is sintered. Fuel for sintering is anthracite duff from Wales. Sinter is conveyed by crane and aerial cableway to storage piles of 100,000-ton capacity, located at the railway siding. A poorly designed government-owned switchyard serves the 350,000-ton storage area at the mine.

Equipment in use at Nsuta in 1947 included:

Number	Item	Horsepower (Probably per unit)	
5	Portable compressor	340	
12	Rock drill	—	
4	Water tube boiler	1,580	
4	Vertical boiler	480	
2	Rock crusher	425	
2	Steam engine	1,040	at power-plant
2	Oil engine	2,140	at power-plant
2	Transformer	—	at power-plant
2	Miles of transmission lines	—	at power-plant
11	Surface pump	1,150	
2	Winder, AC and DC	245	
13	Excavator -- steam, diesel, and electric	1,680	
28	Locomotive -- steam, diesel, and electric	3,010	
½	Mile of ropeway	—	

In 1948-49, the working force consisted of approximately 40 Europeans and 3,400 Africans. A large modern cafeteria seats 400 at a time and serves 3,000 meals per day.

During 1948-49 the company also worked on its concession at Hotopo on the Sekondi-Axim road near the coast.

In order to increase production in the Nsuta area, additional equipment, including excavators, locomotives, etc., is being purchased in the US. All production not shipped with the US as a destination is shipped to the UK. France receives about 25,000 tons per year via the UK. It is estimated that 900,000 tons will be shipped in 1951, of which 600,000 tons will reach the US; the ferro-manganese will be manufactured in Norway or Canada. An estimated 75,000 tons of battery grade ore is included in the 600,000 ton figure. This estimated supply for 1951 to the US represents an increase of 100,000 to 150,000 tons over 1950.

The ore as shipped from the Nsuta area is mainly raw metallurgical grade plus some sinter, with a lesser amount shipped separately as battery grade material. The installation of the sintering plant has resulted in 15 to 20 percent reduction in moisture contained in the shipped product, with a proportionate increase in ship capacity.

b. Other Manganese Areas.

1. The Aboaji and Ayahu deposits near Salmon (Esamang) in the Axim District, southwestern Gold Coast, are low in manganese and high in silica content. Both quality and quantity are too low for the ore to be marketable.

2. Two small concessions located in an area 14 miles west of Takoradi, 4 miles northwest of Dixcove, and 1¼ miles from Asani in southwestern Gold Coast have been operated by the Yakau Manganese Co. Between 1941 and 1946 (when mining ceased) an estimated 9,000 tons were removed. Over half came from an open cut on the south slope of Hemakrom Hill, where the ore lies in a bed 4 feet thick, located 26 feet below the surface. The ore was washed, bagged, and trucked 21 miles to Takoradi. Proved reserves amount to 30,000 tons.

3. The Frary Manganese Co. Ltd., P.O. Box 25, Sekondi, is reported (February 1950) to have obtained manganese concessions and to have started operations at Dixcove, Yakau, and Salmon.

Transportation.

All the manganese ore from Nsuta is transported to Takoradi by rail. The ore is sent to Takoradi because it is the only deep water port of the Gold Coast.

The construction of roads in the Gold Coast has been minimized because they would compete with the government-owned railway. There are 8,114 miles of roads, of which 636 miles are paved with tar, 2,078 are gravelled, and the rest are unimproved, seasonal, dirt roads. Although trucking has increased in recent years because much of the railroad is only single track, any attempt to truck manganese ore in the quantity now carried by the railroad

would require an enormous outlay for trucks, fuel, maintenance, and road repair. The road from Nsuta to Takoradi is graded and gravelled; it is roughly 60 miles long, whereas the rail route is 39 miles.

Treated ore is reclaimed from stockpiles at Nsuta and loaded by diesel shovels onto gondolas of 25-ton capacity. Twenty or more cars make up a train, and five or six such trains run over the 39 miles of 3'6"-gauge track to Takoradi each working day. Sidings and passing loops enable the traffic to move in both directions, which is necessary because of the large amounts of timber and cocoa that are also moved over this route.

The railroad, however, is unable to handle all the freight offered and has long been recognized as the principal bottleneck in Gold Coast manganese production. A plan for double-tracking the railroad from Tarkwa to Takoradi has been approved and is in process of implementation. Rolling stock presents another problem. The 15 new locomotives received in mid-1949 were quickly placed in service, but those they were to replace had not been taken out of service as of May 1950. Coal was normally obtained from Nigeria until late 1949, when the supply was cut off, and cheaper and better coal is now obtained from Mozambique.

The railroad passes through an area of forest and steppe with an annual rainfall of 50 to 70 inches except in the extreme south, where it drops to 35 inches. This dryer part near the coast has a population density of over 200 per square mile, whereas the density farther inland ranges from 25 to 50 per square mile, which is evenly distributed in small villages and clusters of homes, both on and away from the railroad. The railroad crosses several dozen small streams, most of them probably by conduit. The largest river, the Bonsa, is bridged at Esuaso, 28 miles from Sekondi.

Railway workshops and marshalling yards are located at Sekondi, five miles from Takoradi.

In January 1950, a strike of the railroad workers resulted in the dismissal of 722 employees.

Loading.

The coastal village of Takoradi was transformed in 1928-31 into a planned town, with the only deep water harbor in the Gold Coast. The 220-acre harbor is formed by an L-shaped main breakwater on the south and a straight lee breakwater to the north. The fairway between the two breakwaters is 600 feet wide. There are no cargo-handling facilities on the south breakwater. The main quay at the head of the harbor has a wharf for timber, lighter transit shed, and cocoa storage sheds. From the quay outward along the inside of the north breakwater are: a coaling berth, tug jetty, manganese berth, two general cargo berths, and, near

the seaward end, a bauxite loading berth. On the north side of the north breakwater is a tanker berth. The railroad from Sekondi, 5 miles north, has several sidings that serve the whole length of the main quay and the three lines of track along the north breakwater that serve all but the bauxite berth.

In the curve of the south breakwater are six moorings with depths of 20 to 28 feet; west of them are three smaller moorings for coastal vessels. Along the western part of the south breakwater are lighter moorings.

Moored vessels can take on log rafts or handle small cargo lots by lighter; those in the manganese or general berths are also permitted to take on logs from the water side while loading from the dock side.

The cramped nature and general inadequacy of the harbor is due to its small size and number of facilities available for the increasing volume of traffic, rather than to obsolete machinery or cumbersome practices. The majority of ships using the harbor are not able to berth, and some are unable to anchor inside the harbor. Manganese ships have at times been forced to wait for weeks until the single loading berth was free.

A £ 2,250,000 contract for enlargement and alteration of the harbor was signed in 1949, presumably with Taylor Woodrow Construction Ltd. Work was begun sometime during the last seven months of 1950 and was scheduled for completion in 1951 but is at least a year behind schedule. Furthermore, officials of the construction company estimate that the harbor, as now planned, would be inadequate or would relieve congestion for only a few years. The plan calls for moving the bauxite berth to the north side of the north breakwater (outside the harbor) and adding two more berths on the south side of the north breakwater near its seaward end. Railway facilities and the quay approach are to be enlarged and timber wharves built. No plans are reported for changing manganese-loading facilities.

Manganese tonnage available for loading is controlled by rail shipments from the mine, which range from 2,000 to 3,000 tons per day and average 16,000 tons per week. Since the ore is sent to Takoradi as it is produced (as of October 1950), there is probably very little in storage at the mine. A storage area near Takoradi station can hold 80,000 tons and one at the manganese berth 18,000 tons.

The manganese loading operation is entirely mechanical. The 25-ton ore gondolas made up at the mine are emptied at the larger storage area or are shunted onto the wharf. Here the cars run through a tippler, where they are emptied one at a time into a hopper. The hopper empties onto an apron feeder which may discharge onto the wharf stockpile or deliver the ore to a conveyor system where it is weighed and carried by shuttle to a

loading bridge. The loading bridge is on a gantry that runs the length of the manganese berth, thus enabling it to load any hold of a ship. Ore can be reclaimed from the wharf stockpile by two steam shovels that run on tracks and empty into the loader. If ore is to be reclaimed from the larger storage area, it must again be mechanically shoveled into the 25-ton cars, which are then shunted onto the wharf and tippler.

Speed of loading is by no means up to the capacity of some of the facilities. The loader, for example, can deliver 1,000 tons per hour, but more than 3,000 tons are seldom loaded per day because only that much can be brought in by rail. Inefficiency on the part of local cargo trimmers also keeps the loading rate down to about 200 tons per hour. Vessels may load to a draft of 28'6", but if so loaded, they can move out only at high water, since the minimum channel depth at low water is 25 feet. In addition, a heavy surge is reported in the manganese and general cargo berths.

The Oil Storage Company of Takoradi has an oil pool that is a joint venture by the Shell, Socony Vacuum, Texas, and Atlantic Oil Companies, and is operated by Socony. The pool is located 2½ miles north of Takoradi and is connected with the fuel berth on the north side of the north breakwater by three pipelines.

Strategic Points.

a. At the Mine.

(1) Power shovels.
(2) Rolling stock, 2 foot-6 inch gauge.
(3) Two ore washers.
(4) Water supply for washing ore.
(5) Two ore crushers.
(6) Sintering plant.
(7) Power plant and transmission lines.
(8) Aerial cableway.
(9) Small machinery such as portable compressors, rock drills, and surface pumps.

b. On the Railroad.

(1) All rolling stock.
(2) Bridge over the Bonsa River at Esuaso.
(3) Other smaller bridges and culverts.
(4) Sidings and passing loops.
(5) Railway workshops at Sekondi.
(6) Labor difficulties which have already created one strike of serious proportions.

c. At the Port.*

(1) Railroad sidings on the quay and on the north breakwater.
(2) Tippler at the manganese berth. (This is the only means by which cars can be unloaded on the wharf, other than by hand labor.)
(3) Two steam shovels on tracks at the manganese berth. (Their function is to help maintain an even flow of ore to the loading bridge instead of loading only when an ore train arrives.)
(4) Conveyor shuttle and weighing system at the manganese berth.
(5) Loading bridge at the manganese berth.
(6) Entire channel from the manganese berth to open water. (For instance, a boatload of cement sunk in the manganese berth would require special equipment for its removal. As an example of equipment available, the heaviest crane is one of 15-ton capacity.)

* Although the plans for Talcoradi harbor facilities do not include improvement of manganese facilities, this is probably because the factor controlling quantity loaded is the railroad to the port, not the port itself.

2. Present Status of Local Measures to Protect Vulnerable Facilities.

The African Manganese Corporation is very secretive about its operations, and precise information on security measures is difficult to obtain. Present information is that the corporation is keenly aware of the danger of sabotage. In 1950 a man was sent out from England to oversee the installation of all possible security measures. Barbed wire fences have been erected surrounding the mines and shipping docks, with guards on 24-hour duty. Extra precautions are taken at the diesel power plant and at the mines. All labor at the plant is white; no natives are allowed in.

The political situation presents no serious difficulty. Ten of eleven agitators supposedly with Communistic leanings were recently jailed.

3. Security Comment.*

a. Conclusions.

Despite certain security measures taken by the African Manganese Co., Ltd., some vulnerability to sabotage exists with respect to an uninterrupted supply of manganese from the Gold Coast to the US. Most vulnerable to sabotage are the loading operations and channels in the port of Takoradi and the government-owned railroad from the mines to this port.

b. Recommendations.

(1) The Gold Coast Government and the African Manganese Co., Ltd., should jointly consider developing: (a) the surface road from Insuta to Takoradi as an emergency facility in the event of sabotage to the railroad, and (b) alternate manganese loading facilities at Takoradi harbor.

(2) The Gold Coast Government should be approached regarding the establishment of an effective security program.

* This section, dealing with security, has been prepared by the CIA component responsible for security matters.

APPENDIX

a. Selected Maps.

(1) Geological Map of Nsuta Mine [locates roads, railroads, dumps, working faces, and some operations]; Plate of "The Geology of the Nsuta Manganese Ore Deposits," by H. Service, Gold Coast Geological Survey Memoir No. 5, 1943; US Bureau of Mines File No. QE 327.G61 No. 5.
(2) Takoradi Harbour, Gold Coast; 1:5,400; no date; CIA Call No. 62322.
(3) Takoradi Harbor, General Plan; 1:4,500; 1942; CIA (OSS) 695.
(4) Takoradi and Sekondi Bays; 1:12,300; with inset of Takoradi Harbor at 1:7,500; 1943; H.O. 5524.
(5) Africa; 1:250,000; sheets Prestea, 1934, and Takoradi, 1946; Gold Coast Survey, Accra; AMS Call No. 25G 3-30-15301-250.
(6) Africa; 1:62,500; Gold Coast Survey, Accra; 1938-40 sheets No. 8, 20, 21, 22, 23; AMS Call No. 25G 3-30-15301-62.

b. Photographs Available in CIA Graphics Register.

(1) Screen and Separator Units in Washing Plant at African Manganese Mine; no date; CIA 15817.
(2) Aerial cableway transferring sintered ore to stockpile at the African Manganese Mine; no date; CIA 15818.
(3) Conveyor delivering ore to a stockpile at the African Manganese Mine; no date; CIA 15819.
(4) View showing ore being tipped into washing plant feed bin at the African Manganese Mine; no date; CIA 15822.
(5) General view of a section of the African Manganese Mine; no date; CIA 15823.
(6) Managense being loaded from a stockpile by diesel shovel for conveyance to Takoradi; no date; CIA 15825.
(7) The sinter plant: The power house at the manganese dumps at the African Manganese Mine; no date; CIA 15826.
(8) Marshalling sidings on the branch railway Sekondi-Takoradi; no date; [redacted] 25X1A2g
(9) Sekondi: Railway workshops; no date; [redacted] 25X1A2g
(10) Sekondi: Railway workshops; no date;
(11) Ship loading manganese at Takoradi [the loading bridge on the gantry], Picture No. 2 of "Introducing West Africa" issued by Central Office of Information, London, 1948 or 1949.
(12) Truck tipping machinery used at Takoradi Harbour in shipping manganese ore for export; "The Gold Coast" published by Gold Coast Public Relations Department, Accra, 1950, p. 26.